REMARKS

Claims 1, 5, 18 and 19 are pending. Claims 1, 5, 18 and 19 are rejected by the January 9, 2006 Office Action. Claim 19 has been cancelled. Claims 1, 5, and 18 have been amended. The amendment to claim 18 incorporates limitations of cancelled claim 19 and is also supported by Figs. 6 and 7 and by page 2, lines 26-32. The amendment to claim 5, deletes a limitation that referred to a previously deleted limitation of claim 1. The amendment to claim 1 is supported in the specification at page 13, second paragraph, lines 11 through 21. New claims 25-29 have been added. Claim 25 is supported at page 3 lines 5-12. Claim 26 is supported at page 16, lines 19-24, and page 19, lines 29-31. Claim 27 is supported at page 10, lines 11-21. Claims 28 and 29 are supported at page 11, lines 1-4.

35 U.S.C. § 112

Claims 1, 5, 18 and 19 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

Claims 1 and 18 were rejected because the term "immediately adjacent" requires an assessment of a degree of closeness so that the specification must give the reader some yardstick by which to measure such a degree of closeness. Furthermore, claim 18 was rejected because it states that the shell side port and the drain pipe are "immediately adjacent" to one another. The Examiner states that this is misdescriptive, apparently based on the representation in one of the figures, since the Examiner states that "the two ports in question are on opposite sides of the heat exchanger in positions that are about as far apart as one can imagine."

Regarding the misdescriptive comment, the figures, together with the description, serve to explain the principles of the invention and are not representative of all possible embodiments. Thus, the representation at Fig. 9, wherein the drain pipe and the fluid passing port are pictured on opposite sides, is just one embodiment of the invention. The specification provides a definition for the term "immediately adjacent fluid passing port" as referring to an outlet or an inlet for a fluid which is disposed on the shell in the shell-and-tube heat exchanger or an outlet or an inlet which is disposed on the side surface in

the spiral heat exchanger. (Specification, page 7 line 31 to page 8, line 4). Therefore, the Examiner's reliance on a particular figure is unwarranted and the specification does provide the necessary description for assessing the term. For this reason, Applicant asserts that the claims are definite.

35 U.S.C. §§ 102 and 103

Claims 1 and 5 were rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Deuse (U.S. Patent No. 4,236,576). Applicant traverses the rejection.

The Examiner indicated that Deuse Fig. 1 shows conduits 23 and 17 that are deemed to be "immediately adjacent" outside of the heat exchanger and are connected together so that they pass the same fluid. The Examiner further indicated that in Deuse Figs. 2 and 3, the vent pipe 23 is connected to the upper tube sheet, which is formed with conduits 22 and 21 internal to it.

The heat exchanger recited in instant claim1 has a significant difference from that of Deuse in that Applicant's heat exchanger causes gas accumulating in the upper part of the heat exchanger to be driven out through the vent pipe.

Deuse describes that conduit 23 is connected with riser conduit 17. The remainder of the steam-water mixture is passed through the pertaining apertures in the thick tube top 11 into cooling channels 21 which extend parallel to each other between the tubes 8. Thence the remainder is either passed through the annular chamber 22 or, when annular chamber 22 is absent, is passed directly through the communicating conduits 23 into the riser conduits 17. The pertaining apertures are, according to Figs. 1 to 6, in the form of cooling pockets 19, e.g., recesses, about the tubes 8, and are, according to figs. 7 and 8, in the form of counter-suck holes 20 arranged adjacent to the tubes 8 and centrally, relative to the cooling channels 21. Thus, air tends to accumulate in the upper part of the heat exchanger of Deuse, so that the heat exchanger does not provide the high thermal efficiency effect of the present invention and corrosion can result.

From the above discussion it is clear that Deuse does not recite all the elements of the claimed heat exchanger and does not provide any suggestion to modify the Deuse heat exchanger in the manner of the present invention.

Claim 18 was rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kieren (U.S. Patent No. 808,385). Applicant traverses the rejection.

The Examiner asserted that Kieren shows an inlet port 15 and an outlet port 29 for the tube-side fluid, an inlet port for the shell-side fluid at the juncture of pipe 30 and shell 5, and an outlet 31 for the shell-side fluid. The Examiner asserted Kieren shows a drain pipe 33 as part of lower tube sheet 19 draining chamber 18 and having the same fluid passing through it as the outlet 31.

Instant claim 18 has a limitation that the drain reaches the interior of the shell. Kieren's drain pipe 33, although part of lower tube sheet 19, does not reach the interior of the shell. Kieren's drain pipe 31, although reaching the interior of the shell, does not incorporate the lower tube sheet 19. Thus, unlike the drain of the present invention, Kieren's feed-water heater does not have a device to prevent sludge from accumulating in the bottom of the shell.

Furthermore, Kieren does not show a vent pipe, at least part of one end being made from an upper tube sheet part and the other end being connected to a second fluid passing port passing the same fluid as the vent pipe. Thus Kieren does not anticipate the claimed invention. Furthermore, in order to show obviousness, evidence must be presented of some teaching or suggestion in the prior art to alter the prior art invention in the manner of the claimed invention. No such evidence has been presented in this rejection of claim 18.

Claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Kieren and Deuse. Applicant traverses the rejection.

The Examiner asserted that to have provided the tube plate 11 of Kieren with a port (as in 23 and associated passages 22 and 21 of Duse, Fig. 3) would have been obvious to improve the efficiency of the device by allowing more flow of the shell-side fluid over the outside of the tubes near the top of the device. The Examiner asserted that

to have connected that port to the outlet port at the upper end of pipe 17 of Kieren or to the pipe to the left of the junction of pipes 31 and 33 in Kieren would have been obvious to permit the flow to be conveniently pumped away without the necessity of two pumps. The Examiner asserted this connection to the port in the modified Kieren structure is fairly taught by Deuse (where pipes 17 and 23 are shown to be connected to one another).

The modified apparatus that the Examiner described does not meet the limitations of the claimed invention, as discussed in the section directly above, incorporated herein. Notwithstanding the modifications proposed by the Examiner, the modified apparatus of Kieren does not have a drain that reaches the interior of the shell so as to remove sludge from the bottom of the shell. Furthermore, the modified apparatus does not have a vent that acts in such a way that fluid flowing through the vent pipe drives out the gas that gets entrapped in the upper portion of the apparatus.

Still further, any combination of references must be supported by a suggestion or teaching in the prior art to combine the references. Kieren is a feed-water heater which functions to heat and purify water that is subsequently directed to a boiler. Deuse is a heat exchanger that functions to cool a hot substance entering the heat exchanger. The Examiner has provided no suggestion or teaching in the prior art that would lead to combining the parts of these two divergent apparatuses in the manner the Examiner has suggested.

Kieren's line 31 which is connected from the side to the lower part of the shell side of the heat exchanger; line 33, line 32, and line 30 are connected with an outer line, so that some fluids therein can be replaced, but sludge tends to accumulate. In view of lines 31 and 33, line 31 is not constructed by means of the lower tube sheet, so that lines 31 and 33 do not lead to the drain structure of the present invention. Kieren describes no pipe arrangement about the vent part of the heat exchangers. Thus it would not be obvious to make the connection of the drain pipe in the lower part of the heat exchanger with an outer fluid passing conduit as in the present invention.

For the above reasons, Kieren and Deuse do not disclose a heat exchanger having improved fluidity of the fluid in the lower part of the shell. Such improved fluidity represses the formation of polymers when an easily polymerizable substance is passed

through the heat exchanger. Furthermore, the fitting place of the drain pipe in Kieren is different from that of the invention defined by the present claims.

In view of the foregoing, Applicants submit that all pending claims are in condition for allowance and request that all claims be allowed. The Examiner is invited to contact the undersigned should he believe that this would expedite prosecution of this application. It is believed that no fee is required. The Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. 13-2165.

Respectfully submitted,

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